

REMARKS

Favorable reconsideration and allowance of this application are requested.

At the outset, applicants note with appreciation the Examiner's indication of allowability of claims 20 and 22. As will become evident from the following discussion, all claims pending in this application are believed to be allowable over the applied references of record.

1. Discussion of Amendments

By way of the amendment instructions above, claim 1 has been amended so as to emphasize that the claimed process is a “***photo-embossing process***”. Support for this amendment can be found in the originally filed application at paragraphs [0005] and [0011].¹

Claim 18 has been revised so as to more affirmatively set forth that the polymeric relief structure is obtained by the process recited in claim 1. The embedded ranges within claim 20 have been deleted and are now present in new claims 28 and 29, respectively.

Therefore, following entry of this amendment, claims 1-29 will be pending herein for which favorable reconsideration and allowance are solicited.

2. Response to 35 USC §112 Issue

The amendment to pending claim 20 is believed to render moot the issue raised under 35 USC §112. Thus, all pending claims are believed to be in conformance with such statutory provision.

¹ Citations to passages in the subject application will be to paragraph numbers of its corresponding publication 2007/0202421.

3. Response to 35 USC §113(a) Issues

Several rejections have been raised under 35 USC §103(a) with respect to several of the previous claims based principally on the applied reference to Goff et al (USP 4,329,419). Specifically, Goff et al and Minamizaki (USP 6,030,662) were combined to reject prior claims 1-5, 7-9, 11-12, 14-15, 17-18 and 23-24 under 35 USC §103(a), while Summersgill et al (USP 6,671,095) was combined with Goff et al and Minamizaki to separately reject claim 6 under the same statutory provision. Fryer et al (*Macromolecules*, vol. 24 (2001), pp 5627-5634) and Phillips et al (USP 6,987,590) were also combined with Goff et al and Minamizaki to reject claims 13 and 16 on the one hand, and claims 10 and 25-27 on the other hand under 35 USC §103(a). Finally, Bailey et al (US 2005/0064344) was combined with Goff et al and Minamizaki to reject claims 19 and 21 under 35 USC §103(a). Applicants suggest that none of the rejections of record is appropriate against the presently claimed invention.

In this regard, applicants note that the process disclosed by Goff et al consists of the following steps:

- I) applying a solution of an improved radiation polymerizable composition (which in fact is the focal point of Goff et al's disclosure) to a substrate and drying the composition such that a film is formed on the substrate;
- II) exposing the film to radiation through a pattern, such that the film is partly photo polymerized in accordance with the exposure pattern;
- III) *dissolving the unexposed and unpolymerized part of the film with a developer solution*; and**
- IV) baking the resulting relief structure to remove the photopolymerized material and forming a polyimide structure with a sharp definition (see Goff et al., column 1 lines 40-50).

The polymerizable compositions disclosed by Goff et al comprise polymers containing photopolymerizable groups (Goff et al at column 1, lines 52-54) which are subjected to photopolymerization in step II. Thus, the polymers containing photopolymerizable groups ***actually react to form a polymer network***.

The subject matter disclosed by Goff et al finds its application in the field of electrical devices such as semiconductors and capacitors (Goff et al. column 1, lines 9-10).

In contrast, the present invention relates to a “***photo-embossing***” process, comprising the steps of:

- a) *Coating a substrate with a coating comprising one or more radiation sensitive ingredients.* The coating composition used in the photo-embossing process comprises a polymer, preferably of the same nature as the polymer resulting from the crosslinking of the radiation sensitive ingredients [0026] which is preferably dissolved in the monomer(s) of the composition [0027]. The polymer acts as a carrier for the reactive components (e.g. monomer(s), photo initiator).
- b) *Locally treating the coated substrate with electromagnetic radiation having a periodic or random radiation-intensity pattern, forming a latent image.* Upon radiating the coating a latent image of radicals originating from the photo-initiator is formed in accordance with the radiation-intensity pattern. In the vicinity of the formed radicals, monomers present in the coating composition may start to polymerize, thus creating a difference in chemical potential (i.e. concentration difference) of the monomer between exposed and unexposed regions. This difference in chemical potential forms the driving force for monomer migration (i.e., from non-radiated to radiated regions [0007]).

- c) *Polymerizing and/or crosslinking the resulting coated substrate.* The latent image formed in step b) is (further) developed by heating above the T_g of the carrying polymer matrix, such that polymerization and diffusion occur simultaneously [0009]. Unreacted monomer present in the unexposed regions diffuses into the polymer matrix (due to concentration gradient of the monomer) and polymerizes, thus increasing the materials volume at the exposed area, which results in a surface deformation [0009].

The present invention provides an improvement over conventional photo-embossing processes by introducing a compound Cs in the composition that reduces the interfacial surface tension of the coated substrate [0011].

The relief structures formed with the photo-embossing process are mainly applied in the field of optical components, such as lenses, gratings, beam splitters, etc [0006].

One significant difference between photo-embossing process and the process disclosed by Goff et al is that photo-embossing uses monomers as reactive component to form the polymer network, while the process disclosed by Goff et al uses photopolymerizable polymers. As a consequence of this difference, in order to create a relief structure, the unpolymerized part of the film needs to be removed by dissolving it with a developer solution (Goff et al step III). A reason for this removal step is that the photopolymerizable polymers in the composition disclosed by Goff et al. will at most minimally or not at all diffuse into the polymerized part of the film. Therefore, another difference between photo-embossing and the process disclosed by Goff et al is that step III described by Goff et al. is not a step practiced in photo-embossing. On the contrary, unreacted constituents are not removed in photo-embossing but are used to develop the latent relief image into a relief structure.

BROER et al
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Due to the fact that the present invention relates to a completely different process and composition than that disclosed by Goff et al, it must be concluded that the present invention cannot be considered obvious over Goff et al. in view of Minamizaki et al. All other secondary references of record that have been combined with Goff et al likewise fail to cure its deficiencies as noted above. Therefore, withdrawal of all rejections advanced under 35 USC §103(a) is in order.

4. Fee Authorization

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140.

Respectfully submitted,

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